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FAA K-9 Program Quality Control Aid Test and Evaluation Plan

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16. Abstract

This document is a Test and Evaluation Plan for an operational test and evaluation of quality control aids (QCAs) for training and testing of the FAA sponsored K-9 teams.

Actual explosives and QCAs will be operationally tested for three types of explosives: double-based smokeless powder, TNT, and C4. The three configurations of each QCA include a cloth patch treated with a pure solution, a cloth pouch treated with a granular composite mixture, and a non-hazardous explosive for security training and testing (NESTT) material. This total of nine QCAs will be evaluated to determine the optimal configuration for the QCAs. The results of the OT&E will be used to select leading candidate QCAs for further evaluation under field operational conditions.

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PREFACE

This test plan will investigate the Critical Operational Issues and Criteria and Additional Evaluation Issues and Criteria set forth by the Federal Aviation Administration. This plan was developed by the Aviation Security Human Factors Program in support of the Trace Detection Program at the FAA's Technical Center, Atlantic City International Airport, New Jersey. Key FAA personnel supporting this plan are J. L. Fobes, Ph.D., Aviation Security Human Factors Program Manager; Susan F. Hallowell, Ph.D., Research Chemist; J. Michael Barrientos, Technical Specialist; and S. Cormier, Ph.D., Engineering Research Psychologist; all employed with the Aviation Security Research and Development Division.

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LIST OF ACRONYMS AND ABBREVIATIONS

ACS	Office of the Associate Administrator for Civil Aviation Security
AEIC	Additional Evaluation Issues and Criteria
AFB	Air Force Base
ANOVA	Analysis of Variance
AOA	Aircraft Operations Area
$\underline{c}$	Decision Criteria
COIC	Critical Operational Issues and Criteria
d′	d Prime, Measure of Sensitivity
FAA	Federal Aviation Administration
INEL	Idaho National Engineering Laboratory
MOP	Measure of Performance
MWDTS	Military Working Dog Training School
NESTT	Non-Hazardous Explosive for Security Training and Testing
N_{fa}	Number of False Alarms
N_h	Number of Hits
OT&E	Operational Test and Evaluation
P_{cr}	Probability of Correct Rejection
P_d	Probability of Detection
P_{fa}	Probability of False Alarm
P_h	Probability of Hit
P_m	Probability of Miss
QCA	Quality Control Aid
R	Regression Coefficient
R^2	Coefficient of Determination
SDT	Signal Detection Theory
TEP	Test and Evaluation Plan

1. INTRODUCTION.

1.1 Background.

Over the past decade, terrorist activity has shifted from hijackings to the use of explosives for sabotaging commercial aircraft. This shift was highlighted dramatically by the Pan American Flight 103 disaster. Terrorists are now capable of building more sophisticated explosive devices that are small, easily disguised and capable of destroying an aircraft, killing hundreds of lives. As part of an ongoing program to counter terrorist bombings, the Federal Aviation Administration (FAA) is supporting the development of systems to detect these explosive devices. Yeaple (1991) evaluated the status of explosives detection technology and concluded that "the technology of terrorism has outpaced airport security." New detection technologies are being developed and tested but, according to Lovett (1992), a dog's nose may be the best detector of explosives. While most detection devices are large, fixed-based, and expensive, dogs are a mobile and relatively inexpensive explosive detectors that have been field tested for many years (Carr-Harris and Thal, 1970; Nolan and Gravitte, 1977; Eastwood, 1990; Francis, 1990a; and Francis, 1990c).

Until recently, most of the evidence for a dog's keen sense of smell was anecdotal. Comparative anatomical studies, however, indicate that dogs have a highly developed olfactory apparatus (Lovett, 1992; Chao, 1977; Coile, in preparation; and Syrotuck, 1972). Mitchell (1976) indicates that the dogs' olfactory system is highly selective and appears to be sensitive to small quantities of relevant target substances. Further, Mitchell indicates that dogs can be trained in olfactory discrimination using operant conditioning principles. The success of dogs in tracking and detecting contraband items and explosives suggests that they are capable of ignoring distractions and attending to signal odorants. Regardless, not much is known about the dog's sensitivity to odor intensity.

The Office of the Associate Administrator for Civil Aviation Security (ACS) has sponsored an initiative to quantify the capabilities and limitations of FAA K-9 teams and improve their performance. Part of this initiative includes conducting an operational test and evaluation (OT&E) to determine the ability of candidate quality control aids (QCAs) to assess FAA K-9 team performance. K-9 teams are currently evaluated annually on their ability to detect explosives hidden within the aircraft operations area (AOA) of U.S. airports. However, there are no procedures in place to more frequently evaluate the ability of K-9 teams to meet performance standards. This is primarily due to the logistical problems associated with procuring and handling actual explosives.

The FAA and Idaho National Engineering Laboratory (INEL) will develop QCAs that mimic the scent of actual explosives. As simulants, they will be easier to handle and deploy than actual explosives, pose no health or safety risks, and have a reasonable shelf life. Thus, the QCAs will allow the FAA to determine the operational readiness of K-9 teams throughout the country on a much more frequent basis than does the current procedure.

1.2 Current Federal Aviation Administration K-9 Program.

FAA K-9 teams are trained by the 341st Military Working Dog Training School (MWDTS) at Lackland AFB. The FAA has 92 K-9 teams available in 31 cities across the United States. Each participating city is required to have at least two teams that meet FAA certification standards.

When a potential threat is declared, the local law enforcement uses FAA sponsored K-9 teams to search the AOA at U.S. airports for clandestine explosives. The main priority of K-9 teams is to provide a 30-minute or less response time to their respective airport when a threat occurs. The second priority is to be able to be sent anywhere in the country should an aircraft in-flight receive a threat.

1.2.1 Monitoring K-9 Team Performance.

Feedback to the FAA on K-9 team explosives detection performance is currently limited to annual certification. Established certification procedures test the K-9 teams with the same explosive materials used during training. These materials, called actual explosive training aids, are small samples (e.g., 1 to 2 pounds) of nine different kinds of explosives.

A potential problem identified during the analysis of the annual certification process is the issue of cross-contamination (Cormier et al., 1995). Currently, cross-contamination can occur when odorants are combined across actual explosive training aids. The problem is that volatile components of actual explosive training aids may contaminate, dilute, or mask the odorants of other training aids. Age, storage, and handling potentially contribute to cross-contamination problems. For instance, the FAA requires that cities change their training aids every four months, yet some cities use training aids that are over a year old. Further, these training aids are shipped and stored in containers that are packed tightly together, possibly allowing the volatile vapors to combine across actual explosive training aids. It is possible that the actual explosive training aids are initially contaminated, and that the dogs are trained to smell only the strongest volatile odor. Therefore, to prohibit the chance of cross-contamination, the FAA will produce, store, and ship the actual explosive training aids and QCAs in a more controlled manner.

1.3 Purpose of The Operational Test and Evaluation.

Through the OT&E, quantified empirical data will be obtained to support the development of a field quality control procedure to routinely verify and validate K-9 team performance after initial FAA explosives detection training. The data will be used to identify a relationship between the volatile signatures of the explosive training aids or the accompanying particular QCAs detection performance.

1.4 Scope of The Operational Test and Evaluation.

The OT&E will focus on determining the effectiveness of actual explosive training aids compared with QCAs in meeting the requirements set forth in the critical operational issues and criteria (COIC) and additional evaluation issues and criteria (AEIC).

Actual explosive training aids and QCAs will be tested for three types of explosives: double-based smokeless powder, TNT, and C4. Three different QCA configurations will be evaluated to ascertain the optimal configuration for each explosive type. The volatile odorants of one of the three explosive types will be contained with each configuration (for a total of nine QCAs). The three QCA configurations include a cloth patch treated with a pure solution (patch 1), a pouch filled with a granular composite, and a non-hazardous explosive for security training and testing (NESTT) material. The FAA and INEL will develop and provide the QCAs for the OT&E.

The OT&E also involves INEL identifying volatile signatures of current actual explosive training aids and candidate QCAs. During the OT&E, INEL will use a hand-held explosive detection device, at the points where a dog makes a detection response, to determine if an actual explosive training aid or a QCA exists. INEL will also use the device to determine if the scent boxes and explosive storage areas are cross contaminated. Additionally, INEL will collect ambient air samples of the actual explosive training aids and QCAs. INEL will perform qualitative sample analyses with a Viking portable mass spectrometer to determine the volatile signatures of the respective explosive training aids and QCAs. The strength of the relationship between the volatile signatures of the actual explosive training aids or the QCAs and the detection performance will be determined.

2. CRITICAL OPERATIONAL ISSUES, EVALUATION STRATEGY, AND CRITERIA.

Each actual explosive training aid and QCA configuration will be evaluated against the COIC using associated Measures of Performance (MOPs).

2.1 Issue 1. Detecting Actual Explosive Training Aids and Quality Control Aids.

What is the probability of detection (P_d) and the probability of false alarm (P_{fa}) for dogs detecting actual explosive training aids and QCA configurations?

This issue will be addressed by recording the number of hits (N_h) and the number of false alarms (N_{fa}) for dogs detecting both actual explosive training aids and QCA configurations using a 10 scent box protocol. Appendix A contains a description of the 10 scent box protocol. The order of explosive training aid and QCA presentation will be counterbalanced so that the dogs will first be presented actual training aids on half of the trials and QCAs first on the other half.

Measures such as P_d and P_{fa}, conventionally used in detection studies, unfortunately vary considerably with changes in decision strategy. Their usage can thus give a distorted picture of K-9 team's efficacy. For example, a very liberal decision strategy (one requiring little convincing) can result in a very high P_d but does so at the cost of a P_{fa} that is also very high. Taken to its extreme, always saying an actual explosive or QCA is present results in no misses but many false alarms.

Signal Detection Theory (SDT) provides an approach for distinguishing between accuracy and decision strategy in evaluating detection performance. The principal advantage over conventional P_d measures is that SDT provides a simple quantitative means of analyzing the two aspects of detection performance - the effectiveness with which explosive vs. no explosive discriminations are made (d′) and the decision criterion (c) used to select between alternatives. This MOP data (below) will be used to derive the P_d, P_{fa}, sensitivity (d′) and c values for each dog-handler team.

Criterion 1. None. Investigative in nature.

MOP 1-1. The N_h observed for each dog handler pair detecting actual explosive training aids and QCA configurations.

MOP 1-2. The N_{fa} observed for each dog handler pair detecting actual explosive training aids and QCA configurations.

MOP 1-3. The d′ observed for each actual explosive training aid and QCA configuration.

MOP 1-4. The c for each actual explosive training aid and QCA configuration.

This issue will be addressed by comparing the P_d, P_{fa}, d′, and c values observed for dogs detecting actual explosive training aids to those dogs detecting each QCA.

2.2 Issue 2. Comparison of Actual Explosive Training Aid and Quality Control Aid Detection Performance.

Is there a difference between detecting actual explosive training aids and QCAs?

Analysis of variance (ANOVA) and post-hoc comparisons will be conducted to determine any statistical differences in detection performance between the actual explosive training aids and the QCA configurations.

Criterion 2. The dogs' overall P_d for explosive training aids is not statistically different than that obtained for QCAs.

MOP 2-1. The N_h observed for each dog handler pair detecting actual explosive training aids and QCA configurations.

Criterion 3. The dogs' overall P_{fa} for explosive training aids is not statistically different than that obtained for QCAs.

MOP 3-1. The N_{fa} observed for each dog handler pair detecting actual explosive training aids and QCA configurations.

Criterion 4. The dogs' overall d′ for explosive training aids is not statistically different than that for QCAs.

MOP 4-1. The d′ observed for each actual explosive training aid and QCA configuration.

Criterion 5. Investigative in nature.

MOP 5-1. The c for each actual explosive training aid and QCA configuration.

2.3 Issue 3. Volatile Signatures.

What are the volatile signatures of the actual explosive training aids and the QCAs?

During the OT&E, INEL will perform qualitative sample analyses using a Viking portable mass spectrometer for air samples on actual explosive training aids and QCA configurations that are detected by the dogs. These air samples will be collected at the end of each day with the last scheduled dog.

A complete description of the sampling and analysis plan (including molecular flow and sampling parameters), analytical methodology, and sampling requirements will be provided in a separate document prepared by INEL.

Criterion 6. None. Investigative in nature.

MOP 6-1. Gas chromatography mass spectral data of actual explosive training aids and QCAs detected.

MOP 6-2. Spectral pattern quantitative value of actual explosive training aids and QCAs detected.

2.4 Issue 4. Volatile Signatures and the Detection of Actual Explosive Training Aids and Quality Control Aids.

Are volatile signatures systematically associated with dog performance in detecting actual explosive training aids and QCAs?

This issue will determine if dog performance in detecting actual explosive training aids and QCA configurations is associated with the identified volatile molecules. ANOVAs and post-hoc tests will be separately conducted on P_d, P_{fa}, d′ and c.

Criterion 7. None. Investigative in nature.

MOP 7-1. Chemical identification of volatile signatures for actual explosive training aids and QCAs.

MOP 7-2. The N_h observed for each dog handler pair detecting actual explosive training aids and QCA configurations.

MOP 7-3. The N_{fa} observed for each dog handler pair detecting actual explosive training aids and QCA configurations.

MOP 7-4. The d′ observed for each actual explosive training aid and QCA configurations.

MOP 7-5. The c for each actual explosive training aid and QCA configuration.

3. ADDITIONAL EVALUATION ISSUES, EVALUATION STRATEGY, AND CRITERIA

Each QCA will be evaluated against the AEIC using the associated MOPs.

3.1 Issue 5. Breed of Dog.

Does the breed of dog affect performance in detecting actual explosive training aids and QCAs?

This issue will be addressed by determining if the breed of dog has any effect on the detection of actual explosive training aids and QCAs. An ANOVA and post-hoc tests will be conducted to determine any statistical differences in detection performance across breeds. This issue will be investigated only if the sample of dogs consists of more than one breed.

Criterion 8. None. Investigative in nature.

MOP 8-1. The breed of the dog.

MOP 8-2. The N_h observed for each dog handler pair detecting actual explosive training aids and QCA configurations.

MOP 8-3. The N_{fa} observed for each dog handler pair detecting actual explosive training aids and QCA configurations.

MOP 8-4. The d′ observed for each actual explosive training aid and QCA configurations.

MOP 8-5. The c for each actual explosive training aid and QCA configuration.

3.2 Issue 6. Age of Dog.

Is the age of the dog associated with performance in detecting actual explosive training aids and QCAs?

This issue will be addressed by determining the relationship between the ages of the dogs and their performance in detecting actual explosive training aids and QCAs. To determine if a relationship exists, a regression analysis will be carried out.

Criterion 9. None. Investigative in nature.

MOP 9-1. The age of the dog.

MOP 9-2. The N_h observed for each dog handler pair detecting actual explosive training aids and QCA configurations.

MOP 9-3. The N_{fa} observed for each dog handler pair detecting actual explosive training aids and QCA configurations.

MOP 9-4. The d′ observed for each actual explosive training aid and QCA configurations.

MOP 9-5. The c for each actual explosive training aid and QCA configuration.

3.3 Issue 7. Experience of Dog.

Is the total time a dog has been certified associated with performance in detecting actual explosive training aids and QCAs?

This issue will be addressed by determining the relationship between the length of time the dog has been certified and its performance in detecting actual explosive training aids and QCAs. This issue will be addressed using the same evaluation strategy described in Section 3.2.

Criterion 10. None. Investigative in nature.

MOP 10-1. Total time each dog has been certified to detect explosives.

MOP 10-2. The N_h observed for each dog handler pair detecting actual explosive training aids and QCA configurations.

MOP 10-3. The N_{fa} observed for each dog handler pair detecting actual explosive training aids and QCA configurations.

MOP 10-4. The d′ observed for each actual explosive training aid and QCA configurations.

MOP 10-5. The c for each actual explosive training aid and QCA configuration.

3.4 Issue 8. Medical History of Dog.

Is a dog's medical history associated with its performance in detecting actual explosive training aids and QCAs?

This issue will be addressed by determining the strength of any relationship between identified illnesses the dogs have suffered and their performance in detecting actual explosive training aids and QCAs. This issue will be addressed using Spearman Correlations of qualitative data obtained from the handler questionnaire. This issue will be investigated only if illnesses have been reported in the sample of dogs.

Criterion 11. None. Investigative in nature.

MOP 11-1. Medical history of each dog.

MOP 11-2. The N_h observed for each dog handler pair detecting actual explosive training aids and QCA configurations.

MOP 11-3. The N_{fa} observed for each dog handler pair detecting actual explosive training aids and QCA configurations.

MOP 11-4. The d′ observed for each actual explosive training aid and QCA configurations.

MOP 11-5. The c for each actual explosive training aid and QCA configuration.

3.4.1 Summary of Issues.

A listing of the issues and the respective MOPs is provided in Table 3-1 below.

Table 3-1. Issues and Respective Measures of Performance

Issue	Measure of Performance
1. Actual Explosive Training Aid and QCA Detection	1-1, 1-2, 1-3, 1-4
2. Comparison of Actual Explosive and QCA Detection Performance	2-1, 3-1, 4-1, 5-1
3. Volatile Signatures	6-1, 6-2
4. Volatile Signatures and Detection Performance Relationship	7-1, 7-2, 7-3, 7-4, 7-5
5. Breed of Dog	8-1, 8-2, 8-3, 8-4, 8-5
6. Age of Dog	9-1, 9-2, 9-3, 9-4, 9-5
7. Experience of Dog	10-1, 10-2, 10-3, 10-4, 10-5
8. Medical History of Dog	11-1, 11-2, 11-3, 11-4, 11-5

4. TEST OVERVIEW.

4.1 Test Limitations and Impact.

None.

4.2 Test and Evaluation Milestones.

Table 4-1 shows the milestones for planning and reporting the OT&E process.

Table 4-1. Test and Evaluation Milestones

Milestone	Date	Responsible Organization
Test Concept/Design Approval	31 July 95	FAA, AAR-510
TEP Submitted	31 July 95	Contractor
TEP Approved	22 November 95	FAA, AAR-510
Develop QCAs	30 November 95	FAA and Contractor
Test Readiness Review	1 December 95	Contractor
Pilot Test	27-31 December 95	FAA and Contractor
QCA OT&E	13-30 January 96	FAA and Contractor
Preliminary Analyses	15 March 96	Contractor
Test and Evaluation Report	31 April 96	Contractor
Evaluation Briefing	9 May 96	Contractor

5. OPERATIONAL TEST AND EVALUATION.

5.1 Location.

The OT&E will be conducted at the Lackland AFB, home of the MWDTS.

5.2 Subjects

Six FAA-certified explosives detection dogs will participate in the OT&E. Four of these dogs are residents for the 37th Security Police Squadron (SPS) at Lackland AFB and two work for the 76th SPS at nearby Kelly AFB, also in San Antonio, Texas. Dogs will be selected solely on availability and certification status. The dogs' handlers will read and sign an informed consent form (see Appendix C) and complete a questionnaire (see Appendix D) prior to participating in the OT&E.

5.3 Actual Explosive Training Aids, QCAs, and Blank QCAs

Actual explosive training aids and QCAs will be composed of three types of explosives: double-based smokeless powder, TNT, and C4. To ascertain the optimal configuration, three QCA configurations will be evaluated - a cloth patch treated with a pure solution (patch 1), a pouch filled with a granular composite, and a non-hazardous explosive for security training and testing (NESTT) material.

A blank QCA is the same material used for the QCA configuration excluding the explosive composition (the volatile odorant contained in the pure solution, granular composite, and the NESTT material). The reason for testing blank QCA configurations is to determine whether or not the dogs are cueing on the "blank" instead of the simulant.

5.4 Test Organization.

Five test administrators will be required for this study shown in Table 5-1. A description of the duties, responsibilities, and schedule for each test administrator is included in Appendix E and F.

Table 5-1. Test Administrator Required for Quality Control Aid Operational Test and Evaluation

Personnel Number	Title	Agency
1	Test Director	FAA
2	Test Manager	Contractor
3, 4	Data Collector	FAA
5	Trial Coordinator	Contractor

5.5 Test Organization Training.

The test organization will receive a partial-day training session on test procedures and protocol prior to the OT&E. The test administrator's data collection instructions and a sample data collection form are provided in Appendix G.

5.6 Test Coordination Meeting.

Approximately one month prior to the OT&E, a test coordination meeting will be conducted at Lackland AFB to set up the test equipment and verify that the test administrators are familiar with the operational testing protocol. Dogs will not be needed for this meeting; however, the test administrators will practice the test protocol as if dogs were present. Test administrators will set up, label, and store all scent boxes in the appropriate areas. Test administrators will also ensure that the test site is accessible and available for the scheduled test times for pilot test and the OT&E. If there is a conflict, and alternate test site will be selected and prepared. Test administrators will ensure that the test area environmental conditions are consistent for testing. For instance, the test site's climate control system must be between 60 and 70 degrees Fahrenheit. Wind currents from fans, vents, or open windows or doors must be identified and eliminated. Handlers participating in the pilot test and OT&E will attend a meeting on January 5 to discuss the testing protocol. Test administrators will read a standardized in-briefing to the handlers and will answer any questions concerning the schedule or testing protocol (see Appendix H for the in-briefing). Handlers will complete the informed consent and questionnaire forms and review the testing schedules to ensure that all individuals are familiar with their testing times.

5.7 Pilot Study.

Approximately 2 weeks before the OT&E, a pilot study will be conducted at Lackland AFB to verify the test protocol and data collection procedures. Three dogs experienced in detecting smokeless powder, TNT, and C4 will participate in the pilot study. As these dogs will not be participating in the OT&E, they do not need to be certified by the FAA to detect explosives, but must be proficient in detecting at least one explosive types.

The schedule of the pilot test is provided in Appendix I. As the schedule illustrates, 3 days are required for testing. Dogs will receive two 1-hour trials per day for a total of six trials. Each trial is divided into two half-hour segments. A segment consists on one QCA test and one actual explosive test. Each dog will be tested in detecting one type of explosive training aid and three configurations of QCAs with the respective explosive odors. Thus, the nine QCAs will be presented to the dogs; however, each dog will only receive the three QCAs treated with the odor of the explosive training aid that it is proficient in detecting. The pilot test will use the same protocol as the OT&E (see Section 2.7).

5.8 Operational Test Protocol.

Before testing begins, participating handlers will attend an in-briefing, complete the informed consent and questionnaire, and review testing schedules. The test schedule, provided in Appendix J, give the testing times and location for each dog handler pair. Only test administrators will have schedules that list the explosive type and QCA configuration to be presented to the K-9 teams.

The test protocol consists of a 1-hour testing trial which is repeated throughout the course of the OT&E. To minimize the chance of an order effect, QCA configuration and explosive type presentation will be counterbalanced across dogs. Each trial is divided into two half-hour segments. For each segment, one QCA test and one actual explosive test will be conducted where each dog will be presented the same explosive type for the actual explosive training aid and QCA configuration for each respective segment. The dogs will detect the actual training aids first for half of the trials and the QCAs first for the other half.

Each of the actual explosive training aid trials will test the dogs' ability to detect the same actual explosive type as represented in the QCA testing trial (i.e., If pure C4 were the QCA configuration type tested for the first trial, then the actual explosive training aid to be tested would be C4 for that trial). The dogs will also be tested on their ability to detect each QCA configuration. Three QCA configurations will be evaluate for the three explosive types for a total of nine configurations which will require nine trials per dog.

One hundred and fifty scent boxes will be used for the OT&E. To reduce the possibility of cross-contamination, each target scent box will be used to contain only one type of explosive training aid or one type of QCA. For the QCA testing, five boxes will contain a target QCA and five will contain a blank QCA of the same configuration (see Section 5.3 on blank QCAs). For the actual explosive training aid testing, five boxes will contain explosive aids of the same type and five will remain empty.

The test manager will be responsible for ensuring that the dogs are available for each testing session. The trial coordinator will ensure the appropriate selection, handling, placement, and storage of actual explosive training aids and QCAs used for each testing session (see Appendix E for duties). The trial coordinator will also ensure the proper markings, selection and storage of the scent boxes. Prior to the beginning of each trial, test administrators will set up two testing areas in an available theater at Lackland AFB. Appendix K provides a diagram of the test area. The two testing areas are the lobby and on the stage of the theater. Each testing area will contain 10 scent boxes staggered with approximately 4-foot separations (see Appendix A, Figure A-2). For each test area, five scent boxes will contain a target (e.g., actual explosive training aid or QCA) and five will either remain empty or contain a blank QCA. For both tests, distribution of the five target scent boxes will be randomized. A detailed description of the 10 scent box protocol is provided in Appendix A.

Once the test areas are set up, a handler and dog pair will enter the appropriate area. The handler will direct the dog to the first scent box. The dog will place its nose in the hole on the top of the box. If the dog detects an explosive, it will respond by sitting. The handler, who does not know which scent boxes contain training aids, will offer the dog a reward for a correct response. If the

dog responded incorrectly, a test administrator will stop the handler from giving the dog a reward by saying "No" before the handler reaches for the reward. The handler will then direct the dog to the next scent box. This procedure continues until all scent boxes have been examined.

After completing the first explosive detection test segment, the handler will walk the dog to the second test area, where the above test scenario will be repeated. Upon completing all trials, handlers will be debriefed and asked for their opinions of the testing.

5.8.1 Scent Box Management.

The 341st MWDTS will construct the boxes to measure 12 inches x 12 inches x 6 inches with a 6 inches diameter hole in the center. The seams of the boxes will be sealed with masking tape and store them in an area that has not been contaminated by explosives. Boxes will be marked to indicate the explosive type and QCA configuration that they will contain (the marking will be placed on the bottomside of the box, out of sight for the handler). Prior to constructing the boxes, personnel will wash their hands and put on nylon gloves provided by INEL. The trial coordinator will ensure that gloves are replaced each time prior to handling an explosive training aid or QCA. The 341st MWDTS will not put any explosive training aids, objects, or substances in the boxes. See Appendix A for the key as to how the boxes will be marked.

5.8.2 Ambient Air Sampling Protocol.

INEL will collect air samples of the actual explosives and QCA configurations that the dogs will be attempting to detect. The air sampling will collected during the 10 scent box protocol with the hand-held explosive detection devices for every dog's hit or miss sit response. Thus, the device will be used to determine if explosives or QCA were present each time a dog makes a hit or false alarm response. All dogs will participate in the INEL data collection effort.

INEL will also collect air samples each day with sampling pumps and absorbent traps. The samples will be analyzed with a mass spectrometer to determine the volatile signatures of the explosives and QCAs available to be detected by the last dog. Analysis will require approximately 2 to 4 hours per air sample, a requirement imposed by the equipment. Blank air samples will be collected immediately prior to collecting each of the actual explosive aid and QCA samples.

6. DATA.

6.1 Critical Operational Issues Data.

The values of N_h and N_{fa} will be used to derive the actual explosive training aid and QCA detection performance of each dog. The training aid detection variables are P_d, P_{fa}, d′, and $\underline{c}$ and their calculated values will be compared across explosive training aid, QCA configuration, and volatile signature.

The N_h will be used to calculate the P_d as follows:

$$P_d = N_h/5$$

where 5 is the total number of target presentations.

The N_{fa} will be used to calculate the P_{fa} as follows:

$$P_{fa} = N_{fa}/5$$

where 5 is the total number of empty scent boxes.

The above probability will be used to determine SDT measures by converting P_d and P_{fa} to z-scores, where z-scores are abscissa values from the standard normal curve.

P_d and P_{fa} will be used to determine a value of d′ as follows:

$$d' = Z_{fa} - Z_h$$

where Z_h and Z_{fa} are abscissa values of the normal curve determined from P_d and P_{fa} respectively.

P_d and P_{fa} will be used to determine a value of $\underline{c}$ as follows:

$$\underline{c} = 0.5(Z_h + Z_{fa})$$

Volatile signatures, spectral pattern, and spectral pattern retention time of the actual explosive training aids and QCAs will be collected and calculated by INEL. A three-dimensional spectral analysis will identify the molecules available for detection of each sampled explosive training aid and QCA configuration.

6.2 Additional Evaluation Issues Data.

The breed, age, experience, and medical history of the dogs will be obtained from the handler questionnaire completed following QCA testing. (A sample handler questionnaire is provided in Appendix D.) Performance data will be collected and manipulated as described in Section 6.1.

6.3 Test Data Management.

6.3.1 Operational Test Data.

The final operational test database will contain the data required to statistically analyze the COICs and AEICs. Table 6-1 lists the data elements to be included in the database.

Table 6-1. K-9 Quality Control Aid Operational Test and Evaluation Database

Dog Number
Handler Number
Training Aid (type of explosive)
QCA Configuration
Molecule Type
Signature Data Smokeless Powder Training Aid
Signature Data TNT Training Aid
Signature Data C4 Training Aid
Signature Data QCA1
Signature Data QCA5
Signature Data QCA9
Breed of Dog
Age of Dog
Experience of Dog
Medical History of Dog

N_h, N_{fa}, **d'**, and **c** for the following:
Smokeless Powder Training Aid
TNT Training Aid
C4 Training Aid
QCA 1
QCA 2
QCA 3
QCA 4
QCA 5
QCA 6
QCA 7
QCA 8
QCA 9

7. DATA ANALYSIS.

7.1 Critical Operational Issues.

7.1.1 Comparison of Actual Explosive Training Aid and Quality Control Aid Detection Performance.

The P_d, P_{fa}, d′, and c for dogs detecting actual explosive training aids and QCA configurations will be the dependent variables. The experimental design used to make these comparisons will be a 4 training aids (actual, patch, pouch, NESTT) x 3 explosive types (smokeless powder, TNT, C4) within subjects design, as depicted in Table 7-1.

Four separate ANOVAs will determine any significant differences between P_d, P_{fa}, d′, and c across training aids and explosive type, according to Table 7-2. Where significant effects are determined, Duncan post-hoc comparisons will be used to isolate significant differences between explosive configurations.

Table 7-1. Experimental Design Used to Test Training Aid Detection

Actual			Patch			Pouch			NESTT		
SP	TNT	C4	SP	TNT	C4	SP	TNT	C4	SP	TNT	C4
dog1	dog1	dog1	dog1	dog1	dog1	dog1	dog1	dog1	dog1	dog1	dog1
dog2	dog2	dog2	dog2	dog2	dog2	dog2	dog2	dog2	dog2	dog2	dog2
dog3	dog3	dog3	dog3	dog3	dog3	dog3	dog3	dog3	dog3	dog3	dog3
dog4	dog4	dog4	dog4	dog4	dog4	dog4	dog4	dog4	dog4	dog4	dog4
dog5	dog5	dog5	dog5	dog5	dog5	dog5	dog5	dog5	dog5	dog5	dog5
dog6	dog6	dog6	dog6	dog6	dog6	dog6	dog6	dog6	dog6	dog6	dog6

Legend: SP = Smokeless Powder
Actual = Actual Explosive Training Aid

Table 7-2. Analysis of Variance Summary for Dogs Detecting Actual Explosive Training Aids and Quality Control Aids

Source	SS	df	MS	F	p
Dogs (subjects)	SS_D	5	MS_D	--	--
Aid	SS_A	3	MS_A	MS_A/MS_{AXD}	--
Explosive (Exp)	SS_E	2	MS_E	MS_E/MS_{EXD}	--
Aid x Exp	SS_{AXE}	6	MS_{AXE}	MS_{AXE}/MS_{AXEXD}	--
Aid x Dogs	SS_{AXD}	15	MS_{AXD}	--	--
Exp x Dogs	SS_{EXD}	10	MS_{EXD}	--	--
Aid x Exp x Dogs	SS_{AXEXD}	30	MS_{AXEXD}	--	--

7.1.2 Volatile Signatures and the Detection of Actual Explosive Training Aids and Quality Control Aids.

An experimental design will be determined by INEL following the lab identification of volatile molecules. Mean performance scores will be stratified according to the identified molecules. ANOVAs will be conducted on the dogs' P_d, P_{fa}, d', and c with the identified molecules as the dependent variable, based on the experimental design. The identified molecules per training aid will be determined subsequent to air sampling.

7.2 Additional Evaluation Issues.

7.2.1 Breed.

The P_d, P_{fa}, d', and c will be the dependent variables for dogs detecting the actual explosive training aids and QCA configurations compared across breed. The experimental design used to make these comparisons will be a 4 training aids (actual, patch, pouch, NESTT) x 3 breeds (Labrador, German Shepherd, Belgian Malenois) within subjects test, as depicted in Table 7-3.

Table 7-3. Experimental Design Used to Test the Effect of Breed on Training Aid Detection

Actual			Patch			Pouch			NESTT		
Lab	GS	BM	Lab	GS	BM	Lab	GS	BM	Lab	GS	BM
dog1	dog3	dog5	dog1	dog3	dog5	dog1	dog3	dog5	dog1	dog3	dog5
dog2	dog4	dog6	dog2	dog4	dog6	dog2	dog4	dog6	dog2	dog4	dog6

Legend: Lab = Labrador BM = Belgian Malenois
GS = German Shepherd Actual = Actual Explosive Training Aid

ANOVAs will be conducted according to Table 7-4. Where significant effects are determined, Duncan post-hoc comparisons will be used to isolate differences.

Table 7-4. Analysis of Variance Summary for Training Aid Detection Testing at Lackland Air Force Base

Source	SS	df	MS	F	p
Dogs (subjects)	SS_D	5	MS_D	--	--
Aid	SS_A	3	MS_A	MS_A/MS_{AXD}	--
Breed	SS_B	2	MS_B	MS_B/MS_{BXD}	--
Aid x Breed	SS_{AXB}	6	MS_{AXB}	MS_{AXB}/MS_{AXBXD}	--
Aid x Dogs	SS_{AXD}	15	MS_{AXD}	--	--
Breed x Dogs	SS_{BXD}	10	MS_{BXD}	--	--
Aid x Breed x Dogs	SS_{AXBXD}	30	MS_{AXBXD}	--	--

7.2.2 Experience.

The regression analysis will be carried out as discussed in Sections 3.2 and 3.3. This analysis will indicate the unique predictive contribution of age and experience on the dogs' performance in detecting the actual explosive training aids and QCAs.

8. PRESENTATION OF OPERATIONAL TEST AND EVALUATION RESULTS.

8.1 Critical Operational Issues.

P_d, P_{fa}, d′, and c values of dogs detecting the actual explosive training aids and QCAs will be reported. Significant effects resulting from the ANOVAs will be reported, along with associated mean and standard deviations for each condition. The results of the Duncan post-hoc comparisons conducted on any significant main effects or interactions will also be reported. Volatile molecules and significant effects, as determined by the ANOVA, will be reported along with Duncan comparisons.

8.2 Additional Evaluation Issues.

8.2.1 Breed.

Significant main effects resulting from the ANOVA carried out on P_d, P_{fa}, d′, and c across conditions will be reported, along with associated mean and standard deviations for each condition. The results of the Duncan post-hoc comparisons conducted on any significant main effects will also be reported.

8.2.2 Experience.

The regression coefficient (R) and the coefficient of determination (R^2) will indicate the strength of the relationship between P_d, P_{fa}, d′, and c, and age and experience.

9. REFERENCES.

Coren, S. and L. M. Ward, Sensation and Perception, Harcourt Brace Jovanovich, New York, 1984.

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Lovett, S., Explosives Search Dogs, in S. M. Khan (Ed.), Proceedings of the First International Symposium on Explosives Detection Technology, FAA Technical Center, Atlantic City International Airport, NJ, 1992.

Prestrude, A. M. and J. W. Ternes, The Dog/Human Team in Explosives Detection, paper presented at The Conference on Methods of Security Screening, The Royal Society, London, 1992.

Travis, B. E. and A. Willett, The Dog Report, Federal Aviation Administration, Burlington, MA, 1991.

Wickens, C. D., Engineering Psychology and Human Performance, Harper-Collins, New York, 1992.

APPENDIX A - 10 Scent Box Protocol

A 10 scent box protocol will be used during this study. Each trial consists of five boxes with the odor in them and five uncontaminated boxes. Figure A-1 provides a diagram of a scent box, while Figure A-2 provides a diagram of how the boxes will be arranged. For the QCA test. a set pf five uncontaminated boxes will contain a blank QCA of the same configuration. A blank QCA is the same material used for the QCA configuration excluding the explosive composition (the volatile odorant contained in the pure solution, granular composite, and the NESTT material). The reason for testing blank QCA configurations is to determine whether or not the dogs are cueing on the "blank" instead of the simulant. For the actual explosive training aid testing, the five uncontaminated boxes will remain empty.

To begin testing: Start with the dog in the sit position, one step away from the first box (see Figure A-3). Have the handler present the box to the dog ensuring that it sniffs in or above the hole (see Figure A-4). Allow the dog time to respond, but do not allow the dog to walk. If the dog exhibits a correct sit response, present primary, then secondary reward (see Figures A-5 and A-6). If the dog exhibits an incorrect response, pull the dog out of this response. Continue to the next scent box. Make sure the canine sniffs in all boxes that are presented.

The bottom of the scent boxes will be marked with black magic marker to indicate what type of target odor it contains. Table A-1 shows how the boxes should be labeled and the quantity needed:

TABLE A-1. Box Labels And Quantity Of Boxes With Each Label

Box Label	Quantity
PP-SP	5
PP-SP-B	5
PP-TNT	5
PP-TNT-B	5
PP-C4	5
PP-C4-B	5
PC-SP	5
PC-SP-B	5
PC-TNT	5
PC-TNT-B	5
PC-C4	5
PC-C4-B	5
N-SP	5
N-SP-B	5
N-TNT	5
N-TNT-B	5
N-C4	5
N-C4-B	5
SP	5
SP-B	5
TNT	5
TNT-B	5
C4	5
C4-B	5

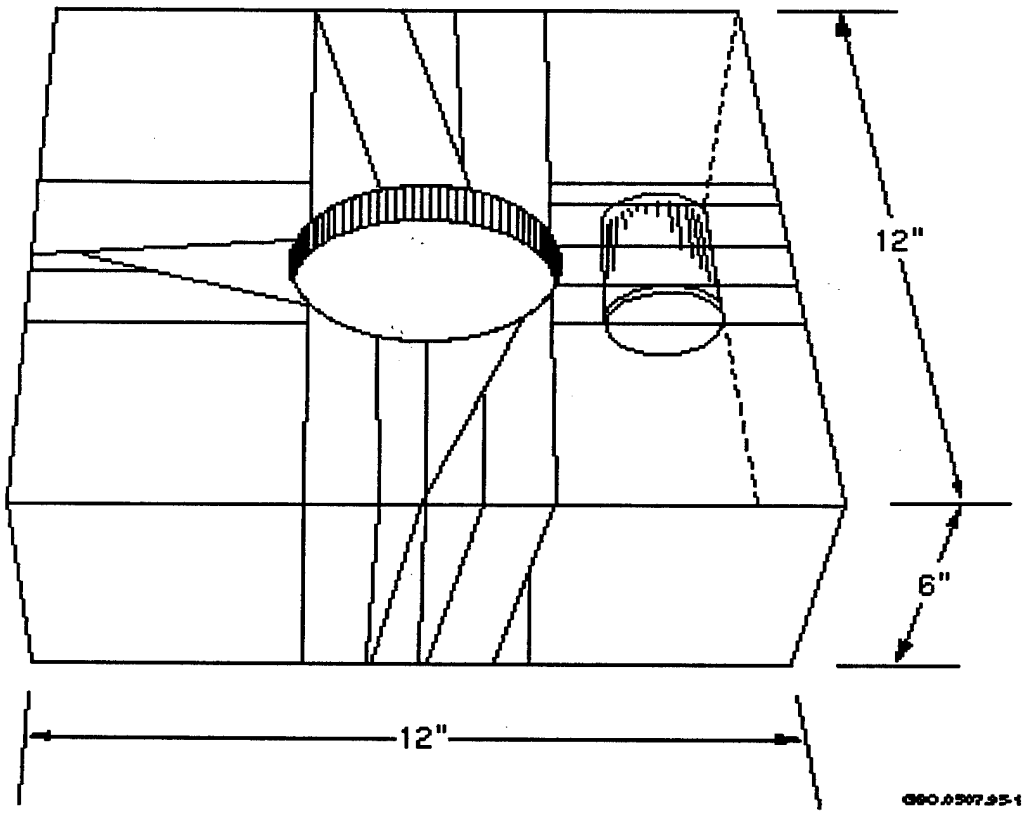


FIGURE A-1. Scent Box

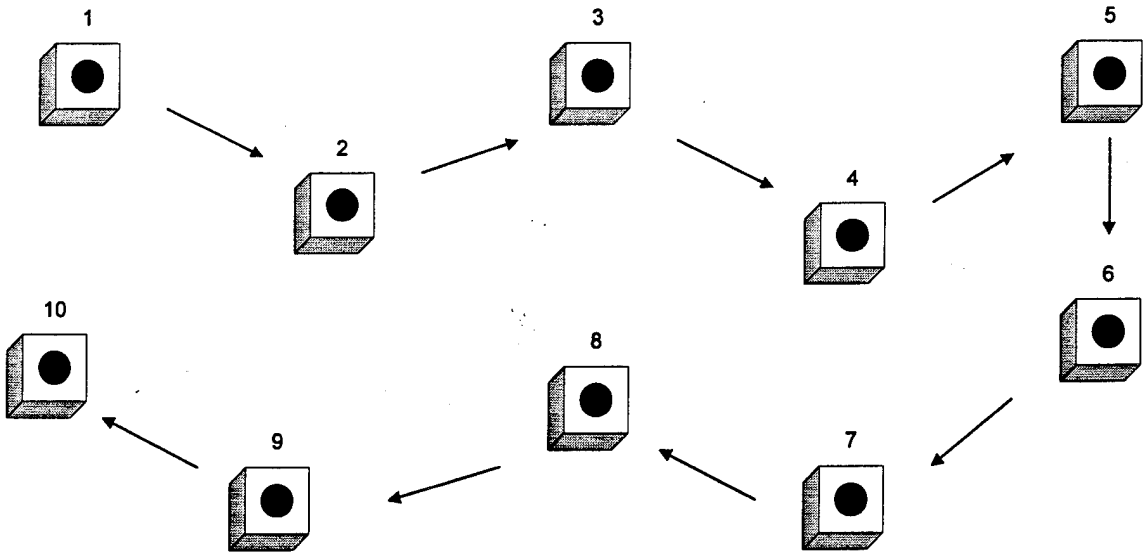


FIGURE A-2. Proposed Scent Box Arrangement to Conduct the 10 Scent Box Protocol

FIGURE A-3. Dog Prepares to Begin 4-Scent Box Protocol

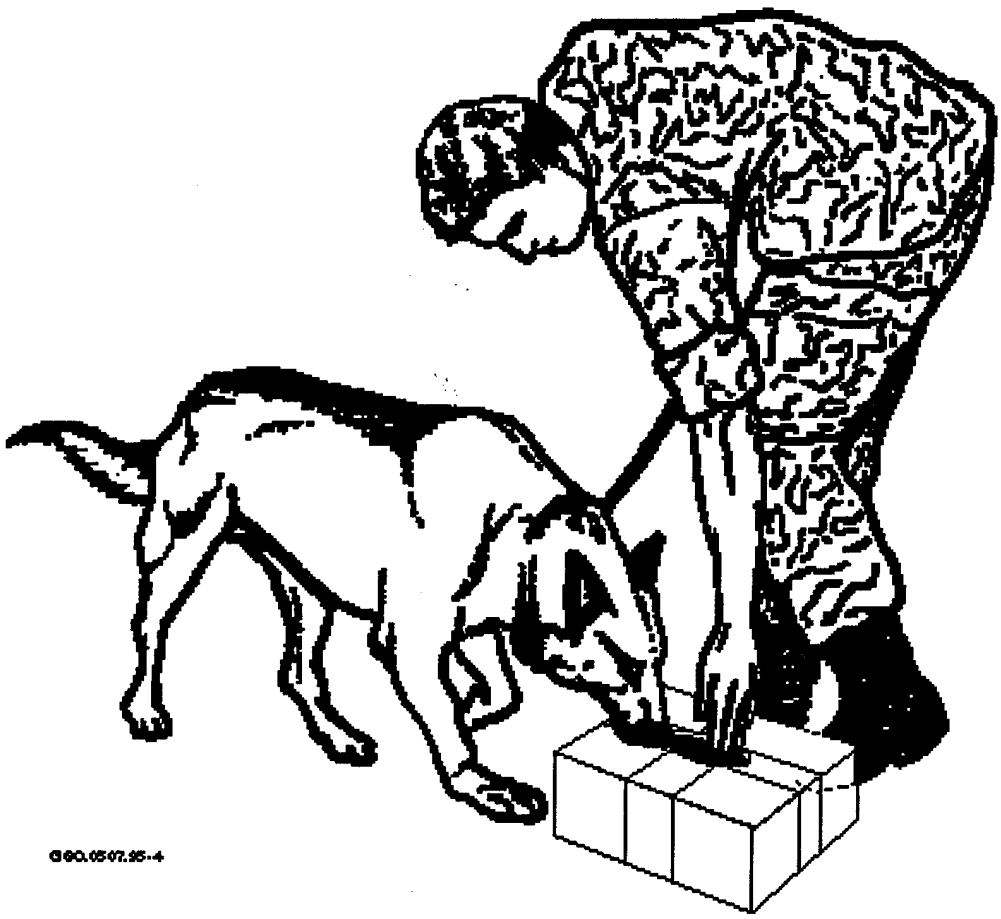


FIGURE A-4. Dog Sniff Scent Box for Target Odor

FIGURE A-5. Dog Detects Target Odor and Provides Sit Response

FIGURE A-6. Handler Provides Primary Reward to Dog For Detecting Target Odor

APPENDIX B - Signal Detection Theory

The Signal Detection Theory (SDT) Paradigm.

Signal Detection Theory (SDT) is a mathematical representation of signal detection performance in deciding whether or not a signal is present. An operational example of SDT is an explosives detection dog engaged in olfactory tasks to detect explosives. The explosives hidden in various scent boxes represent signals that the dogs must detect.

There are two response categories that represent a dog's detection performance: yes (an explosive signal was present), or no (an explosive signal was not present). There are also two signal presentation states, indicating that the explosive signal was present (signal) or absent (noise). A combination of dog-handler responses and the signal state produces a 2 x 2 matrix (Figure B-1), generating four classes of responses, labeled as hits, misses, false alarms, and correct rejections (Wickens, 1992). A hit will be recorded when a dog-handler team correctly detects an explosive hidden in a scent and a false alarm will be recorded when a team detects' an explosive hidden in a scent box when none is present.

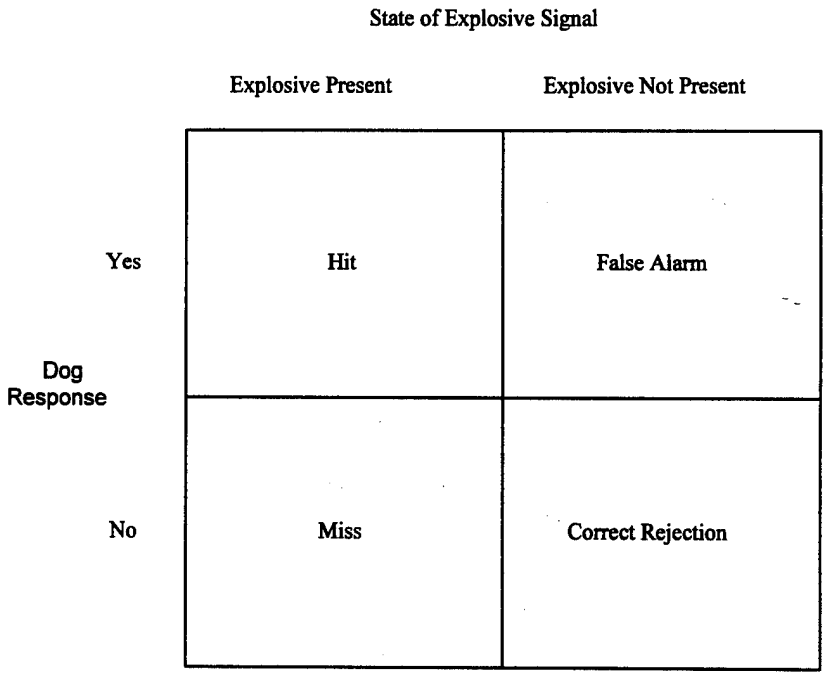


FIGURE B-1. 2x2 Matrix of Dog Team Responses and State of Explosive Signal

As indicated by Wickens (1992), the SDT paradigm assumes that there are two stages of information processing in all detection tasks: sensory evidence is aggregated concerning the presence or absence of the signal, and a decision is made about whether this evidence constitutes a signal. According to SDT, external stimuli generate neural activity in the brain. On the average, there will be more sensory or neural evidence in the brain when a signal is present than when it is absent. This neural evidence, X, referred to as the evidence variable, represents the rate of firing of neurons in the brain. The response rate for detecting X increases in magnitude with stimulus (signal) intensity. Therefore, if there is enough neural activity, X exceeds a critical threshold, X_c, and the dog provides a sit response indicating yes, there is an explosive. If there is too little, the dog decides no and continues with the explosive search. The dog's response is then interpreted by its handler. Because the amount of energy in the signal is typically low, the average amount of X generated by signals in the environment is not much greater than the average generated when no signals are present (noise). Furthermore, the quantity of X varies continuously, even in the absence of a signal, because of random variations in the environment and the dog's level of neural firing (i.e., the neural noise in the dog's sensory channels and brain).

The relationship between the presence and absence of a signal can be seen in the hypothetical noise and signal plus noise distributions contained in Figure B-2. The intersection of the two curves represents the location where the probability of a signal equals the probability of noise. The criterion value, X_c, chosen by the operator, is shown by the vertical line. All X values to the right ($X > X_c$) will cause the operator to respond "yes." All X values to the left generate "no" responses. The different shaded areas represent the occurrences of hits, misses, false alarms, and correct rejections.

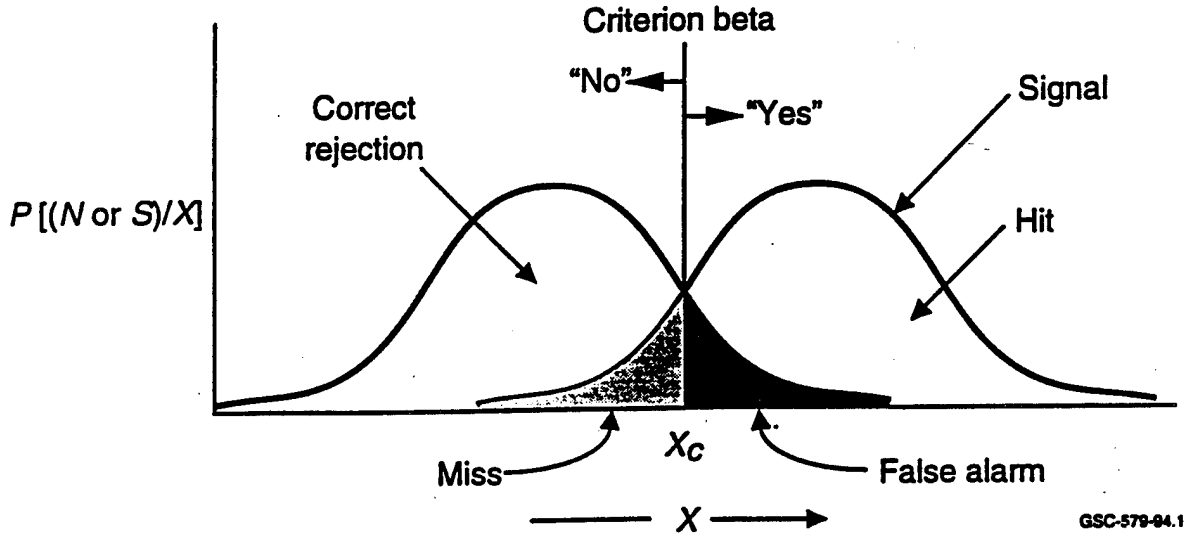


FIGURE B-2. Hypothetical Signal Detection Theory Distributions (Wickens, 1992)

Procedures to Calculate SDT Probabilities.

a. In SDT, the detection values are expressed as probabilities.

b. The probability of a hit (P_h), miss (P_m), false alarm (P_{fa}), and correct rejection (P_{cr}) are determined by dividing the number of occurrences in a cell (Figure B-1) by the total number of occurrences in a column.

c. The P_h (also referred to as the probability of detection [P_d]) will be calculated by dividing the number of explosives detected (number of hits) by the total number of hits and misses:

$$P_m = 1 - P_d$$

d. The P_{fa} will be determined by the number of false alarms divided by the total number of false alarms and correct rejections:

$$P_{cr} = 1 - P_{fa}$$

Sensitivity (d′).

Sensitivity refers to the average amount of sensory activity generated by a given signal as compared with the average amount of noise-generated activity (Coren and Ward, 1989). Sensitivity, d′, corresponds to the separation of the means of the signal and noise distributions (Figure B-2). As the magnitude of the signal increases, the mean of the signal distribution moves to the right. The proportion of signals detected (the P_d) changes as the distance between the signal and noise distributions varies. According to Wickens (1992), if the separation between the distributions is great, sensitivity is great and individuals can quite readily distinguish a signal plus noise event from a noise only event. Similarly, if the separation between signal and noise is small, d′ measures will be low.

Table B-1 provides a representative table of Z values and ordinate values of the probability distribution related to hit and false alarm responses. A complete table of the ordinate values of the standard normal distribution will be used to calculate d′ for the Test and Evaluation Plan.

The procedures required to calculate d′ are as follows (Coren and Ward, 1989):

a. Find the false alarm rate from the outcome matrix in the HIT/FA column of Table B-1.

b. Read across the table to the Z column (the label of the abscissa of the graph) and write down the value.

c. Repeat these operations for the hit rate, calling the tabled value Z_h.

d. Calculate d′ using the following equation: $d' = Z_{fa} - Z_h$.

Handler Response Criterion (c)

In a signal detection task, handler decision making may be described in terms of an handler response criterion. Handlers may use risky response strategies by responding yes more often than no. A risky strategy allows handlers to decide on most of the responses they receive from their K-9, but also produces many false alarms. Alternatively, handlers may use conservative strategies, saying no most of the time, making few false alarms, but missing many of the signals.

One recent parametric measure of response bias is c (Ingham, 1970; Macmillan & Creelman,1990; Snogdgrass & Corwin, 1988). The chief differnce between the measure c and its parametric alternative B lisein the manner in which they locate the observer's criterion. Whereas the bias index B locates the observer's criterion by the ratio of the ordinates of the signal-plus-noise (SN) and noise (N) distributions, c locates the criterion by its distance from the intersection of the two distributions measure in z-score units. The intersection defines the point where bias is neutral, and the location of the criterion at that point yields a c value of 0. Conservative criteria yield positive c values, and liberal criteria produce negative c values. The measure c is computed as follows:

$$c = .5(z_{fa} + z_h)$$

Table B-1. Representative Z-Scores Of The Normal Curve For Different Response Probabilities Used To Calculate D′

HIT/FA	Z	HIT/FA	Z
.01	2.33	.50	0.00
.02	2.05	.55	-0.12
.03	1.88	.60	-0.25
.04	1.75	.65	-0.38
.05	1.64	.70	-0.52
.08	1.40	.75	-0.67
.10	1.28	.80	-0.84
.13	1.13	.82	-0.92
.15	1.04	.85	-1.40
.18	0.92	.88	-1.18
.20	0.84	.90	-1.28
.25	0.67	.92	-1.40
.30	0.52	.95	-1.64
.35	0.38	.96	-1.75
.40	0.25	.97	-1.88
.45	0.12	.98	-2.05
.50	0.00	.99	-2.33

APPENDIX C - Informed Consent

I, _____, have received a briefing by the FAA representative as to the purpose of the FAA study. I understand the purpose of the study and have been provided with the opportunity to ask questions. The FAA representative informed me that the study will require approximately 12 hours, potentially spread over several days.

I understand that this study will impose very little stress and will not affect my K-9 handler status in any way. As part of the data analysis, my data will be combined with that of other individuals and I will no longer be identifiable as a participant. I have been informed that my name will remain CONFIDENTIAL.

I have been informed that I have the right to withdraw from the experiment, and that the test manager may terminate my participation in the interest of safety and the experiment. I also certify that I am at least 18 years of age.

I have been informed that if additional details are needed, I may contact any of the test administrators during the study, or Susan F. Hallowell, Ph.D., (609) 485-4771, or Robert L. Malone, (609) 645-0900, upon completion of the study.

Signed: _____

Date: _____ / _____ /_____

Witness: _____

Date: _____ / _____ /_____

APPENDIX D - Handler Questionnaire

DATE:_____ SUBJECT NUMBER:_____ GENDER:_____

1. How long have you been a certified handler? _____

2. What is the date of your last certification? _____

3. Have you ever lost your certification? Yes No

   If yes, please explain.

   _____

   _____

   _____

4. How long have you been paired with the dog participating in this study? _____

5. How long has this dog been certified? _____

6. Has the dog ever failed certification? Yes No

   If yes, please explain.

   _____

   _____

   _____

7. What breed is this dog? _____

8. How old is this dog? _____

9. What sex is this dog? _____

   Is your dog neutered? Yes No

10. Please list any medical problems this dog has experienced:

    _____

    _____

    _____

11. Have you provided the test administrator with a copy of this dog's medical history? Yes No

APPENDIX E - Statement Of Duties

Test Director:

Responsible for directing and overseeing all test activities and personnel.

Federal Aviation Administration (FAA)

Test Manager:

Ensures that detection teams are greeted and that they complete the required administration procedures.
Conducts briefs and debriefs.
Manages daily test activities and starts and stops the test sequence as required.
Plans for and directs contingency activities.
Liaisons with 341st Military Working Dog Training Squadron administrative personnel.
Liaisons with Idaho National Engineering Laboratory administrative personnel.
Ensures the presence of the proper detection team in the required location at the required time.
Resolves any encountered problems with the Test Director.
Executes all required logistical activities as required.

Galaxy Scientific Corporation (Galaxy)

Data Collector

Ensures that the subject's number is recorded on test forms.
Ensures that data collection forms are organized and filed.
Ensures that each handler completes a questionnaire.
Briefs and debriefs handler regarding test.
Provides guidance and assistance to handlers on matters pertaining to conduct of test.
Records dog performance on data collection form.
Assists Trial Coordinator in preparing for test trials.

FAA
Galaxy

Trial Coordinator

Plans random order of explosive training aid and quality control aid (QCA) presentation.
Ensures that scent boxes are loaded with proper training aid or QCA.
Ensures that no loaded scent box is used for multiple scents.
Places scent boxes in proper random order prior to each trial.
Ensures that the data collection form states the correct explosive training aid and QCA configurations.
Ensures proper selection, handling, storage, and disposal of explosive training aids and QCAs.

Galaxy

APPENDIX F - QUALITY CONTROL AID OPERATIONAL TEST AND EVALUATION ADMINISTRATIVE PERSONNEL SCHEDULE

Date	Time	Place	Activity	Personnel
Day 0	0800 to 1100	Briefing Room	Briefing	FAA, GSC, INEL, MWDTS
	1200 to 1500	Theater	Logistics and Administration	FAA, GSC, INEL, MWDTS
Days 1-9	0730 to 0800	Theater	Detection Test	FAA, GSC, INEL, MWDTS
	0800 to 0830	Theater	Detection Test	FAA, GSC, INEL, MWDTS
	0900 to 0930	Theater	Detection Test	FAA, GSC, INEL, MWDTS
	0930 to 1000	Theater	Detection Test	FAA, GSC, INEL, MWDTS
	1030 to 1100	Theater	Detection Test	FAA, GSC, INEL, MWDTS
	1100 to 1130	Theater	Detection Test	FAA, GSC, INEL, MWDTS
	1230 to 1300	Theater	Detection Test	FAA, GSC, INEL, MWDTS
	1300 to 1330	Theater	Detection Test	FAA, GSC, INEL, MWDTS
	1400 to 1430	Theater	Detection Test	FAA, GSC, INEL, MWDTS
	1430 to 1500	Theater	Detection Test	FAA, GSC, INEL, MWDTS
	1530 to 1600	Theater	Detection Test	FAA, GSC, INEL, MWDTS
	1600 to 1630	Theater	Detection Test	FAA, GSC, INEL, MWDTS
	1630 to 1700		Data Input and Reduction	FAA, GSC
Day 10	0800 to 1100	Briefing Room	Debriefing	FAA, GSC, INEL, MWDTS
	1200 to 1500		Logistics and Administration	FAA, GSC, INEL, MWDTS

Legend: FAA = Federal Aviation Administration; GSC = Galaxy Scientific Corporation; INEL = Idaho National Engineering Laboratory; MWDTS = Military Working Dog Training Squadron

APPENDIX G - Data Collection Instructions And Form

On the data collection form, record the date, subject number, training aid type, quality control aid (QCA), and the dog's response to each scent box.

Use the following codes when recording the training aid type:

SP	Smokeless Powder
TNT	TNT
C4	C4

Use the following codes when recording the QCA type:

PP - SP	Patch with Pure Smokeless Powder
PP - TNT	Patch with Pure TNT
PP - C4	Patch with Pure C4
PC - SP	Patch with Composite Smokeless Powder
PC - TNT	Patch with Composite TNT
PC - C4	Patch with Composite C4
N - SP	NESTT with Smokeless Powder
N - TNT	NESTT with TNT
N - C4	NESTT with C4

Use the following codes when recording the dog's response:

H (Hit)	Canine sits and there is a concealed explosive.
M (Miss)	Canine does not sit and there is a concealed explosive.
FA (False Alarm)	Canine sits and there is not a concealed explosive.
CR (Correct Rejection)	Canine does not sit and there is not a concealed explosive.

For example: Training Aids __SP__

CR	H	CR	H	H	M	FA	H	CR	CR

QCAs ___PP-SP__

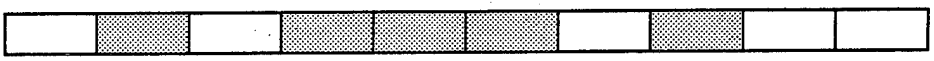
H	CR	H	CR	H	H	CR	H	FA	M

NOTE: Scent boxes containing concealed explosives are indicated by shading.

EXAMPLE DATA COLLECTION FORM
TRAINING AID TEST

SUBJECT NUMBER:_____

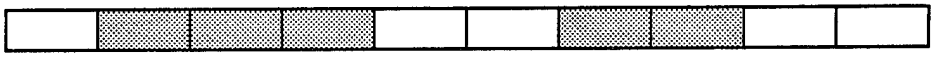
TRIAL #1- DATE:_____

Training Aid _____ 

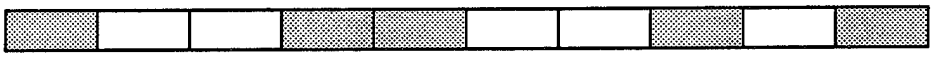
TRIAL #2 - DATE:_____

Training Aid _____ 

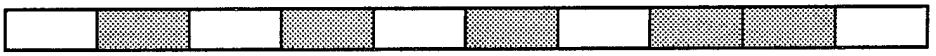
TRIAL #3- DATE:_____

Training Aid _____ 

TRIAL #4- DATE:_____

Training Aid _____ 

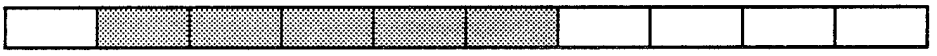
TRIAL #5- DATE:_____

Training Aid _____ 

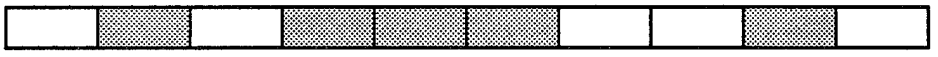
TRIAL #6- DATE:_____

Training Aid _____ 

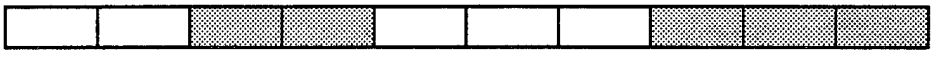
TRIAL #7- DATE:_____

Training Aid _____ 

TRIAL #8- DATE:_____

Training Aid _____ 

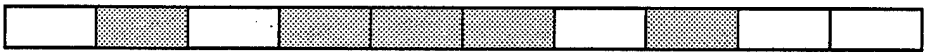
TRIAL #9- DATE:_____

Training Aid _____ 

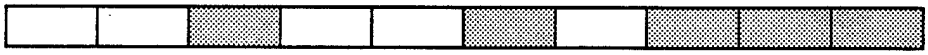
EXAMPLE DATA COLLECTION FORM
QCA TEST

SUBJECT NUMBER:_____

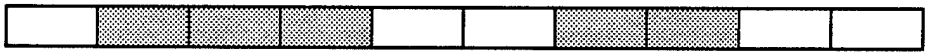
TRIAL #1- DATE:_____

Training Aid _____ 

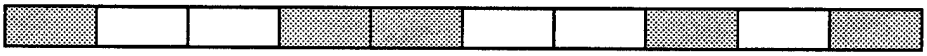
TRIAL #2 - DATE:_____

Training Aid _____ 

TRIAL #3- DATE:_____

Training Aid _____ 

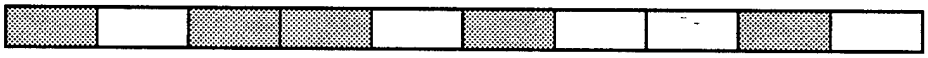
TRIAL #4- DATE:_____

Training Aid _____ 

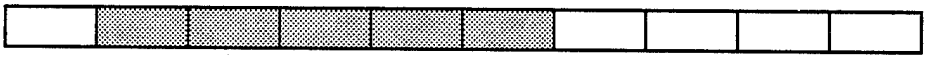
TRIAL #5- DATE:_____

Training Aid _____ 

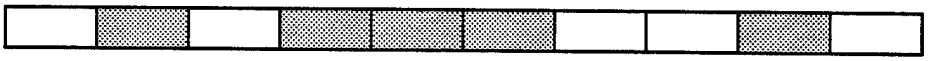
TRIAL #6- DATE:_____

Training Aid _____ 

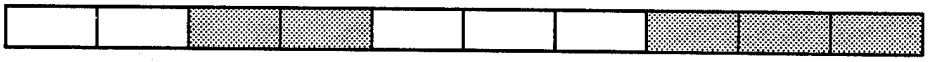
TRIAL #7- DATE:_____

Training Aid _____ 

TRIAL #8- DATE:_____

Training Aid _____ 

TRIAL #9- DATE:_____

Training Aid _____ 

APPENDIX H - Inbrief for K-9 Handlers

Good morning/afternoon. My name is _____ and working with me today are _____ and _____. We would like to welcome you and thank you for your participation. As a member of a K-9 explosives detection team, you are vital to aviation security and your participation in this study will provide information to help the FAA develop new technologies to support your job.

This study involves K-9 teams from Lackland and Kelly Air Force Bases. Our goal is to learn how well K-9 teams can detect simulated explosives. This information will be used to measure the effectiveness of the explosive training aids and will allow the FAA to develop technologies to improve those aids. Your task is to detect explosives that have been hidden in scent boxes. We will direct you to two testing areas. Each area contains 10 scent boxes. Some of the scent boxes contain explosives, but you will not know how many explosives have been hidden or in which boxes they are located.

You will be involved in four activities:

- First, you will be given an informed consent form. Signing this form indicates that you understand what the study is about, and that you agree to take part in it.
- Second, you will fill out a handler questionnaire form. This form will provide us with information, such as how long you have been a handler, and general information about your dog. This form has a 3-digit number that will be used to identify you instead of your name. All of your answers today will use this number and your name will be kept confidential.
- Third, you will be asked to detect the explosives hidden in the scent boxes. If your dog sits in response to an explosive scent and you feel it is correct, please provide a reward. If your dog is incorrect, a test administrator will say "next" prior to you rewarding your dog. At that point, you should not rewared the dog and proceed to the next scent box. Please make sure that your dog is presented with each scent box.
- Fourth, upon completing the testing, you will be asked for your opinions of the study and how your job could be improved.

Your performance will be combined with the performances of all handlers participating in the study. Your name, questionnaire answers, and explosives detection performance will remain strictly confidential. None of this information will be released to your supervisors and will not affect your job in any way.

We have designed these activities to be enjoyable and to be low stress. It should take you approximately 1 hour to finish each day of testing, and the test will last for 9 working days. If you feel that you do not want to participate in this study, or you want to end your participation, you are free to do so. While you are here, we will be available to answer any questions you have. If you any questions after you leave here today, you may call Bob Malone of Galaxy Scientific Corporation or Susan Hallowell of the FAA. Their phone numbers are on the consent form.

Before you begin, do you have any questions or concerns? If there are no more questions, you can begin filling out the forms and then we will begin the test.

APPENDIX I - PILOT TEST SCHEDULE

Dog Number	Date	Time	Place	Activity	INEL
	Day 0	0800 to 1600	341st MWDTS	Brief and Admin.	
P1	Day 1	0730 to 0745	Test Area 1	Detection Trial	
		0745 to 0800	Test Area 2	Detection Trial	
		0800 to 0815	Test Area 1	Detection Trial	
		0715 to 0830	Test Area 2	Detection Trial	
P2	Day 1	0900 to 0915	Test Area 1	Detection Trial	
		0915 to 0930	Test Area 2	Detection Trial	
		0930 to 0945	Test Area 1	Detection Trial	
		0945 to 1000	Test Area 2	Detection Trial	
P3	Day 1	1030 to 1045	Test Area 1	Detection Trial	
		1045 to 1100	Test Area 2	Detection Trial	
		1100 to 1115	Test Area 1	Detection Trial	
		1115 to 1130	Test Area 2	Detection Trial	
P2	Day 1	1230 to 1245	Test Area 1	Detection Trial	
		1245 to 1300	Test Area 2	Detection Trial	
		1300 to 1315	Test Area 1	Detection Trial	
		1315 to 1330	Test Area 2	Detection Trial	
P1	Day 1	1400 to 1415	Test Area 1	Detection Trial	
		1415 to 1430	Test Area 2	Detection Trial	
		1430 to 1445	Test Area 1	Detection Trial	
		1445 to 1500	Test Area 2	Detection Trial	
P3	Day 1	1530 to 1545	Test Area 1	Detection Trial	
		1545 to 1600	Test Area 2	Detection Trial	
		1600 to 1615	Test Area 1	Detection Trial	X
		1615 to 1630	Test Area 2	Detection Trial	X

APPENDIX I - PILOT TEST SCHEDULE (continued)

Dog Number	Date	Time	Place	Activity	INEL
P3	Day 2	0730 to 0745	Test Area 1	Detection Trial	
		0745 to 0800	Test Area 2	Detection Trial	
		0800 to 0815	Test Area 1	Detection Trial	
		0715 to 0830	Test Area 2	Detection Trial	
P1	Day 2	0900 to 0915	Test Area 1	Detection Trial	
		0915 to 0930	Test Area 2	Detection Trial	
		0930 to 0945	Test Area 1	Detection Trial	
		0945 to 1000	Test Area 2	Detection Trial	
P2	Day 2	1030 to 1045	Test Area 1	Detection Trial	
		1045 to 1100	Test Area 2	Detection Trial	
		1100 to 1115	Test Area 1	Detection Trial	
		1115 to 1130	Test Area 2	Detection Trial	
P1	Day 2	1230 to 1245	Test Area 1	Detection Trial	
		1245 to 1300	Test Area 2	Detection Trial	
		1300 to 1315	Test Area 1	Detection Trial	
		1315 to 1330	Test Area 2	Detection Trial	
P3	Day 2	1400 to 1415	Test Area 1	Detection Trial	
		1415 to 1430	Test Area 2	Detection Trial	
		1430 to 1445	Test Area 1	Detection Trial	
		1445 to 1500	Test Area 2	Detection Trial	
P2	Day 2	1530 to 1545	Test Area 1	Detection Trial	
		1545 to 1600	Test Area 2	Detection Trial	
		1600 to 1615	Test Area 1	Detection Trial	X
		1615 to 1630	Test Area 2	Detection Trial	X

APPENDIX I - PILOT TEST SCHEDULE (continued)

Dog Number	Date	Time	Place	Activity	INEL
P2	Day 3	0730 to 0745	Test Area 1	Detection Trial	
		0745 to 0800	Test Area 2	Detection Trial	
		0800 to 0815	Test Area 1	Detection Trial	
		0715 to 0830	Test Area 2	Detection Trial	
P3	Day 3	0900 to 0915	Test Area 1	Detection Trial	
		0915 to 0930	Test Area 2	Detection Trial	
		0930 to 0945	Test Area 1	Detection Trial	
		0945 to 1000	Test Area 2	Detection Trial	
P1	Day 3	1030 to 1045	Test Area 1	Detection Trial	
		1045 to 1100	Test Area 2	Detection Trial	
		1100 to 1115	Test Area 1	Detection Trial	
		1115 to 1130	Test Area 2	Detection Trial	
P3	Day 3	1230 to 1245	Test Area 1	Detection Trial	
		1245 to 1300	Test Area 2	Detection Trial	
		1300 to 1315	Test Area 1	Detection Trial	
		1315 to 1330	Test Area 2	Detection Trial	
P2	Day 3	1400 to 1415	Test Area 1	Detection Trial	
		1415 to 1430	Test Area 2	Detection Trial	
		1430 to 1445	Test Area 1	Detection Trial	
		1445 to 1500	Test Area 2	Detection Trial	
P1	Day 3	1530 to 1545	Test Area 1	Detection Trial	
		1545 to 1600	Test Area 2	Detection Trial	
		1600 to 1615	Test Area 1	Detection Trial	X
		1615 to 1630	Test Area 2	Detection Trial	X
	Day 4	0800 to 1600	341st MWDTS	Debrief and Admin.	

APPENDIX J - Quality Control Aid Operational Test And Evaluation Schedule

Dog Number	Date	Time	Place	Activity	INEL
	Day 0	0800-1600	341st MWDTS	Brief and Admin.	
1	Day 1	0730 to 0745	Test Area 1	Detection Trial	
		0745 to 0800	Test Area 2	Detection Trial	
		0800 to 0815	Test Area 1	Detection Trial	
		0715 to 0830	Test Area 2	Detection Trial	
2	Day 1	0900 to 0915	Test Area 1	Detection Trial	
		0915 to 0930	Test Area 2	Detection Trial	
		0930 to 0945	Test Area 1	Detection Trial	
		0945 to 1000	Test Area 2	Detection Trial	
3	Day 1	1030 to 1045	Test Area 1	Detection Trial	
		1045 to 1100	Test Area 2	Detection Trial	
		1100 to 1115	Test Area 1	Detection Trial	
		1115 to 1130	Test Area 2	Detection Trial	
4	Day 1	1230 to 1245	Test Area 1	Detection Trial	
		1245 to 1300	Test Area 2	Detection Trial	
		1300 to 1315	Test Area 1	Detection Trial	
		1315 to 1330	Test Area 2	Detection Trial	
5	Day 1	1400 to 1415	Test Area 1	Detection Trial	
		1415 to 1430	Test Area 2	Detection Trial	
		1430 to 1445	Test Area 1	Detection Trial	
		1445 to 1500	Test Area 2	Detection Trial	
6	Day 1	1530 to 1545	Test Area 1	Detection Trial	
		1545 to 1600	Test Area 2	Detection Trial	
		1600 to 1615	Test Area 1	Detection Trial	X
		1615 to 1630	Test Area 2	Detection Trial	X

APPENDIX J- QCA TESTING SCHEDULE (continued)

Dog Number	Date	Time	Place	Activity	INEL
2	Day 2	0730 to 0745	Test Area 1	Detection Trial	
		0745 to 0800	Test Area 2	Detection Trial	
		0800 to 0815	Test Area 1	Detection Trial	
		0715 to 0830	Test Area 2	Detection Trial	
3	Day 2	0900 to 0915	Test Area 1	Detection Trial	
		0915 to 0930	Test Area 2	Detection Trial	
		0930 to 0945	Test Area 1	Detection Trial	
		0945 to 1000	Test Area 2	Detection Trial	
4	Day 2	1030 to 1045	Test Area 1	Detection Trial	
		1045 to 1100	Test Area 2	Detection Trial	
		1100 to 1115	Test Area 1	Detection Trial	
		1115 to 1130	Test Area 2	Detection Trial	
5	Day 2	1230 to 1245	Test Area 1	Detection Trial	
		1245 to 1300	Test Area 2	Detection Trial	
		1300 to 1315	Test Area 1	Detection Trial	
		1315 to 1330	Test Area 2	Detection Trial	
6	Day 2	1400 to 1415	Test Area 1	Detection Trial	
		1415 to 1430	Test Area 2	Detection Trial	
		1430 to 1445	Test Area 1	Detection Trial	
		1445 to 1500	Test Area 2	Detection Trial	
1	Day 2	1530 to 1545	Test Area 1	Detection Trial	
		1545 to 1600	Test Area 2	Detection Trial	
		1600 to 1615	Test Area 1	Detection Trial	X
		1615 to 1630	Test Area 2	Detection Trial	X

APPENDIX J - QCA TESTING SCHEDULE (continued)

Dog Number	Date	Time	Place	Activity	INEL
3	Day 3	0730 to 0745	Test Area 1	Detection Trial	
		0745 to 0800	Test Area 2	Detection Trial	
		0800 to 0815	Test Area 1	Detection Trial	
		0715 to 0830	Test Area 2	Detection Trial	
4	Day 3	0900 to 0915	Test Area 1	Detection Trial	
		0915 to 0930	Test Area 2	Detection Trial	
		0930 to 0945	Test Area 1	Detection Trial	
		0945 to 1000	Test Area 2	Detection Trial	
5	Day 3	1030 to 1045	Test Area 1	Detection Trial	
		1045 to 1100	Test Area 2	Detection Trial	
		1100 to 1115	Test Area 1	Detection Trial	
		1115 to 1130	Test Area 2	Detection Trial	
6	Day 3	1230 to 1245	Test Area 1	Detection Trial	
		1245 to 1300	Test Area 2	Detection Trial	
		1300 to 1315	Test Area 1	Detection Trial	
		1315 to 1330	Test Area 2	Detection Trial	
1	Day 3	1400 to 1415	Test Area 1	Detection Trial	
		1415 to 1430	Test Area 2	Detection Trial	
		1430 to 1445	Test Area 1	Detection Trial	
		1445 to 1500	Test Area 2	Detection Trial	
2	Day 3	1530 to 1545	Test Area 1	Detection Trial	
		1545 to 1600	Test Area 2	Detection Trial	
		1600 to 1615	Test Area 1	Detection Trial	X
		1615 to 1630	Test Area 2	Detection Trial	X

APPENDIX J - QCA TESTING SCHEDULE (continued)

Dog Number	Date	Time	Place	Activity	INEL
4	Day 4	0730 to 0745	Test Area 1	Detection Trial	
		0745 to 0800	Test Area 2	Detection Trial	
		0800 to 0815	Test Area 1	Detection Trial	
		0715 to 0830	Test Area 2	Detection Trial	
5	Day 4	0900 to 0915	Test Area 1	Detection Trial	
		0915 to 0930	Test Area 2	Detection Trial	
		0930 to 0945	Test Area 1	Detection Trial	
		0945 to 1000	Test Area 2	Detection Trial	
6	Day 4	1030 to 1045	Test Area 1	Detection Trial	
		1045 to 1100	Test Area 2	Detection Trial	
		1100 to 1115	Test Area 1	Detection Trial	
		1115 to 1130	Test Area 2	Detection Trial	
1	Day 4	1230 to 1245	Test Area 1	Detection Trial	
		1245 to 1300	Test Area 2	Detection Trial	
		1300 to 1315	Test Area 1	Detection Trial	
		1315 to 1330	Test Area 2	Detection Trial	
2	Day 4	1400 to 1415	Test Area 1	Detection Trial	
		1415 to 1430	Test Area 2	Detection Trial	
		1430 to 1445	Test Area 1	Detection Trial	
		1445 to 1500	Test Area 2	Detection Trial	
3	Day 4	1530 to 1545	Test Area 1	Detection Trial	
		1545 to 1600	Test Area 2	Detection Trial	
		1600 to 1615	Test Area 1	Detection Trial	X
		1615 to 1630	Test Area 2	Detection Trial	X

APPENDIX J - QCA TESTING SCHEDULE (continued)

Dog Number	Date	Time	Place	Activity	INEL
5	Day 5	0730 to 0745	Test Area 1	Detection Trial	
		0745 to 0800	Test Area 2	Detection Trial	
		0800 to 0815	Test Area 1	Detection Trial	
		0715 to 0830	Test Area 2	Detection Trial	
6	Day 5	0900 to 0915	Test Area 1	Detection Trial	
		0915 to 0930	Test Area 2	Detection Trial	
		0930 to 0945	Test Area 1	Detection Trial	
		0945 to 1000	Test Area 2	Detection Trial	
1	Day 5	1030 to 1045	Test Area 1	Detection Trial	
		1045 to 1100	Test Area 2	Detection Trial	
		1100 to 1115	Test Area 1	Detection Trial	
		1115 to 1130	Test Area 2	Detection Trial	
2	Day 5	1230 to 1245	Test Area 1	Detection Trial	
		1245 to 1300	Test Area 2	Detection Trial	
		1300 to 1315	Test Area 1	Detection Trial	
		1315 to 1330	Test Area 2	Detection Trial	
3	Day 5	1400 to 1415	Test Area 1	Detection Trial	
		1415 to 1430	Test Area 2	Detection Trial	
		1430 to 1445	Test Area 1	Detection Trial	
		1445 to 1500	Test Area 2	Detection Trial	
4	Day 5	1530 to 1545	Test Area 1	Detection Trial	
		1545 to 1600	Test Area 2	Detection Trial	
		1600 to 1615	Test Area 1	Detection Trial	X
		1615 to 1630	Test Area 2	Detection Trial	X

APPENDIX J - QCA TESTING SCHEDULE (continued)

Dog Number	Date	Time	Place	Activity	INEL
6	Day 6	0730 to 0745	Test Area 1	Detection Trial	
		0745 to 0800	Test Area 2	Detection Trial	
		0800 to 0815	Test Area 1	Detection Trial	
		0715 to 0830	Test Area 2	Detection Trial	
1	Day 6	0900 to 0915	Test Area 1	Detection Trial	
		0915 to 0930	Test Area 2	Detection Trial	
		0930 to 0945	Test Area 1	Detection Trial	
		0945 to 1000	Test Area 2	Detection Trial	
2	Day 6	1030 to 1045	Test Area 1	Detection Trial	
		1045 to 1100	Test Area 2	Detection Trial	
		1100 to 1115	Test Area 1	Detection Trial	
		1115 to 1130	Test Area 2	Detection Trial	
3	Day 6	1230 to 1245	Test Area 1	Detection Trial	
		1245 to 1300	Test Area 2	Detection Trial	
		1300 to 1315	Test Area 1	Detection Trial	
		1315 to 1330	Test Area 2	Detection Trial	
4	Day 6	1400 to 1415	Test Area 1	Detection Trial	
		1415 to 1430	Test Area 2	Detection Trial	
		1430 to 1445	Test Area 1	Detection Trial	
		1445 to 1500	Test Area 2	Detection Trial	
5	Day 6	1530 to 1545	Test Area 1	Detection Trial	
		1545 to 1600	Test Area 2	Detection Trial	
		1600 to 1615	Test Area 1	Detection Trial	X
		1615 to 1630	Test Area 2	Detection Trial	X

APPENDIX J - QCA TESTING SCHEDULE (continued)

Dog Number	Date	Time	Place	Activity	INEL
1	Day 7	0730 to 0745	Test Area 1	Detection Trial	
		0745 to 0800	Test Area 2	Detection Trial	
		0800 to 0815	Test Area 1	Detection Trial	
		0715 to 0830	Test Area 2	Detection Trial	
2	Day 7	0900 to 0915	Test Area 1	Detection Trial	
		0915 to 0930	Test Area 2	Detection Trial	
		0930 to 0945	Test Area 1	Detection Trial	
		0945 to 1000	Test Area 2	Detection Trial	
3	Day 7	1030 to 1045	Test Area 1	Detection Trial	
		1045 to 1100	Test Area 2	Detection Trial	
		1100 to 1115	Test Area 1	Detection Trial	
		1115 to 1130	Test Area 2	Detection Trial	
4	Day 7	1230 to 1245	Test Area 1	Detection Trial	
		1245 to 1300	Test Area 2	Detection Trial	
		1300 to 1315	Test Area 1	Detection Trial	
		1315 to 1330	Test Area 2	Detection Trial	
5	Day 7	1400 to 1415	Test Area 1	Detection Trial	
		1415 to 1430	Test Area 2	Detection Trial	
		1430 to 1445	Test Area 1	Detection Trial	
		1445 to 1500	Test Area 2	Detection Trial	
6	Day 7	1530 to 1545	Test Area 1	Detection Trial	
		1545 to 1600	Test Area 2	Detection Trial	
		1600 to 1615	Test Area 1	Detection Trial	X
		1615 to 1630	Test Area 2	Detection Trial	X

APPENDIX J - QCA TESTING SCHEDULE (continued)

Dog Number	Date	Time	Place	Activity	INEL
2	Day 8	0730 to 0745	Test Area 1	Detection Trial	
		0745 to 0800	Test Area 2	Detection Trial	
		0800 to 0815	Test Area 1	Detection Trial	
		0715 to 0830	Test Area 2	Detection Trial	
3	Day 8	0900 to 0915	Test Area 1	Detection Trial	
		0915 to 0930	Test Area 2	Detection Trial	
		0930 to 0945	Test Area 1	Detection Trial	
		0945 to 1000	Test Area 2	Detection Trial	
4	Day 8	1030 to 1045	Test Area 1	Detection Trial	
		1045 to 1100	Test Area 2	Detection Trial	
		1100 to 1115	Test Area 1	Detection Trial	
		1115 to 1130	Test Area 2	Detection Trial	
5	Day 8	1230 to 1245	Test Area 1	Detection Trial	
		1245 to 1300	Test Area 2	Detection Trial	
		1300 to 1315	Test Area 1	Detection Trial	
		1315 to 1330	Test Area 2	Detection Trial	
6	Day 8	1400 to 1415	Test Area 1	Detection Trial	
		1415 to 1430	Test Area 2	Detection Trial	
		1430 to 1445	Test Area 1	Detection Trial	
		1445 to 1500	Test Area 2	Detection Trial	
1	Day 8	1530 to 1545	Test Area 1	Detection Trial	
		1545 to 1600	Test Area 2	Detection Trial	
		1600 to 1615	Test Area 1	Detection Trial	X
		1615 to 1630	Test Area 2	Detection Trial	X

APPENDIX J - QCA TESTING SCHEDULE (continued)

Dog Number	Date	Time	Place	Activity	INEL
3	Day 9	0730 to 0745	Test Area 1	Detection Trial	
		0745 to 0800	Test Area 2	Detection Trial	
		0800 to 0815	Test Area 1	Detection Trial	
		0715 to 0830	Test Area 2	Detection Trial	
4	Day 9	0900 to 0915	Test Area 1	Detection Trial	
		0915 to 0930	Test Area 2	Detection Trial	
		0930 to 0945	Test Area 1	Detection Trial	
		0945 to 1000	Test Area 2	Detection Trial	
5	Day 9	1030 to 1045	Test Area 1	Detection Trial	
		1045 to 1100	Test Area 2	Detection Trial	
		1100 to 1115	Test Area 1	Detection Trial	
		1115 to 1130	Test Area 2	Detection Trial	
6	Day 9	1230 to 1245	Test Area 1	Detection Trial	
		1245 to 1300	Test Area 2	Detection Trial	
		1300 to 1315	Test Area 1	Detection Trial	
		1315 to 1330	Test Area 2	Detection Trial	
1	Day 9	1400 to 1415	Test Area 1	Detection Trial	
		1415 to 1430	Test Area 2	Detection Trial	
		1430 to 1445	Test Area 1	Detection Trial	
		1445 to 1500	Test Area 2	Detection Trial	
2	Day 9	1530 to 1545	Test Area 1	Detection Trial	
		1545 to 1600	Test Area 2	Detection Trial	
		1600 to 1615	Test Area 1	Detection Trial	X
		1615 to 1630	Test Area 2	Detection Trial	X
	Day 10	0800 to 1600	341st MWDTS	Debrief and Admin.	

APPENDIX K - Test Area For Quality Control Aid Operational Test And Evaluation

(Available Theater at Lackland Air Force Base)